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SOCIETIES AND ACADEMIES.

BIOLOGICAL SOCIETY OF WASHINGTON—273D
MEETING, SATURDAY, MARCH 13.

A PAPER by R. T. Hill and T. W. Vaughn on 'The Lower Cretaceous Gryphæas of the Texas Region' was presented by Mr. Vaughn. He spoke of the abundance of the individuals of this genus and their value in determining the location of artesian wells, the various species being characteristic of certain strata. He traced the phylogeny of the species and dwelt at some length on their involved synonymy.

Chas. F. Dawson spoke of the 'Dissemination of Infectious Diseases by Insects,' instancing the manner in which tuberculosis, swine plague, Texas fever and anthrax could be thus spread. The speaker described his own experience with flies, stating that from their habits they were particularly liable to convey disease.

Under the title, 'The Type (?) of a New-Old Species,' William Palmer spoke of the confusion which existed in regard to certain genus of birds, stating that while Linnæus had originally given a specific name to what he believed to be a cosmopolitan species, he had subsequently admitted a second species, based on a plate, while another author had described a third from still another plate. There was no type existing of any of these, while the authors of the second and third species had no specimens when they established their names. Mr. Palmer stated that two distinct birds had been confused under the three names, and that he proposed to separate them, basing his description on a bird which he had selected among numerous specimens. Would this specimen, to which a binomial name and definite description were attached for the first time, be a type?

Sylvester D. Judd, in a paper entitled 'Sexual Dimorphism in Crustacea,' limited himself to the *Amphipoda*. He stated that while in certain genera the males and females were very similar, there were other genera where secondary sexual characters were so marked that different sexes of the same species might be thought by the casual observer to belong to different genera. The anterior and posterior parts of *Amphipoda* are the parts that present secondary sexual characters. The antennæ are particularly subject to variation; in some

species the inferior antenna is several times as long in the male as it is in the female. In other species the caudal end of the body of the male is monstrously developed. The hairs that occur on the anterior and posterior parts of the body are differently disposed, thus only in the males of *Byblis* do the antennal hairs form brushlike tufts, and in a number of other genera the hairs on the antennæ of the males are modified into elaborate sense organs called calceoli. It appears that the parts of the body of *Amphipoda* which exhibit secondary sexual characters often coincide with those parts upon which specific differentiae are founded.

F. A. LUCAS,
Secretary.

ZOOLOGICAL CLUB, UNIVERSITY OF CHICAGO,
MEETING MARCH 4.

I. *Cleavage of the Egg of Arenicola*. The cleavage belongs to the type known as 'spiral,' or better oblique. There is considerable yolk in the egg and it is almost evenly distributed before segmentation. In the four-cell stage there are three smaller cells and one very large one representing nearly half the entire egg. All the cells contain yolk. The two 'cross-furrows' on the upper and lower poles of the egg are parallel and are formed by the blastomeres B and D; the cross-furrow at the lower pole is much longer than the other, however, and is perfectly constant up to a stage shortly before the closure of the blastopore, thus affording an invaluable means of orientation. The future median plane passes at right angles to this furrow and thus forms an angle of 45° with each of the first two cleavage planes. The upper pole forms the anterior end and the lower pole the posterior end of the worm.

Ectoblasts, mesoblasts and entoblasts are formed in the usual way. The cells X and M (vid. Wilson, *Nereis*) are by far the largest cells in the egg. Primary trochoblasts, sixteen in number, arise from first quartet and are supplemented later by three cells from each of the small micromeres of the second quartet, which complete the prototroch except dorsally, where a break is left. Through this space four cells, derivatives of the first quartet, pass and come to lie posteriorly to the prototroch. The

first bilaterally symmetrical division in the egg (58-cell stage) is the fourth division of the blastomeres of the first quartet, viz., the formation of the apical cross of eight cells. There are no head-kidneys, and the cell corresponding to the nephroblast remains on the surface as a small, inconspicuous ectodermal cell.

The ventral or somatic plate grows as in *Amphitrite*. The second bilaterally symmetrical division in the egg is the third division of the large posterior cell (X). A smaller cell is given off anteriorly and lies across the median plane. The somatic plate broadens laterally and posteriorly, the lateral portions growing posteriorly faster than does the central portion, so that finally the cells along the posterior edge begin to meet in the median line just dorsal to the blastopore. The point where this concrescence begins is the point where the paratroch appears. This organ is formed from derivatives of X, but by an entirely different set of divisions from those which take place in *Amphitrite*, according to Dr. Mead's very kind personal communication. Within the paratroch are enclosed certain small cells which later become the proctodæum.

The first bilaterally symmetrical division of the mesoblast occurs at the seventy-cell stage. In the entomeres a fifth quartet is formed and the three cells of the fourth quartet divide bilaterally. No further divisions occur before the closure of the blastopore.

The first bilateral division, in the small ectomeres, in the large X cell, in the mesoblast and in the entomeres all occur at very different periods in development but in the same generation of cells, viz., the eighth, counting the unsegmented egg as the first.

Gastrulation is a combination of invagination and epiboly. The mesoblast shows the first sign of invagination; then the entomeres also elongate inward until they form a column extending to the ectoderm of the upper pole. Now the ectomeres overgrow their lower surface from the sides and ventrally, forming a triangular blastopore with its short base directed ventrally. The cells forming the lateral and ventral lips of the blastopore are twelve derivatives of the third quartet of ectomeres and later form the stomodæum. The proctodæal region should probably be regarded as a part of the

blastopore, for it is originally continuous with the rest of the opening. It becomes separated from the stomodæum by the postero-anterior concrescence of the somatic plate. The gastrula is bilaterally symmetrical and its axis corresponds to none of the principal axes of the adult.

During the closure of the blastopore the mesoblast bands are forming in the interior of the egg. In this case we have an actual change of the plane of the mesoblast bands through nearly 90°, i. e., from nearly dorso-ventral to longitudinal. The first cells of the bands are given off almost ventrally, but with each successive division of the mesoblasts the direction of the spindle is more nearly longitudinal with respect to the egg, until finally the cells of the bands arise anteriorly from the mesoblasts.

A word concerning the cleavage of *Sternaspis scutata* may be added here. This was worked out as far as the 80-cell stage by the author of this paper and corresponds, cell for cell, with that of *Arenicola*, differing, however, as regards size and structure of blastomeres and order of their formation. Sixteen relatively large cells corresponding to the primary trochoblasts of *Arenicola* are formed, but *Sternaspis* possesses no prototroch and these cells form part of the ectoderm.

II. *The Oblique Cleavage and its Relation to the Mosaic Theory.* After a review of the positions held by Roux, E. B. Wilson, Driesch, Hertwig, etc., the following arguments were given against the mosaic theory as applied to the oblique cleavage.

1. The failure of cell-homology in a rapidly increasing number of cases.

2. The very different size and structure in different species of blastomeres which have the same normal fate.

3. Experimental work. Professor Wilson and Mr. Crampton err in regarding the experiments of the latter on *Ilyanassa* as supporting the mosaic theory, for in most cases 'regeneration' occurs. Mr. Crampton himself states in the text that in $\frac{1}{2}$ and $\frac{1}{4}$ embryos the endoderm cells are *completely* overgrown by ectoderm, and also gives figures illustrating the same fact. It is, of course, impossible for ectoderm cells, which normally cover only the outer surface of cer-

tain endoderm cells, to overgrow in the $\frac{1}{2}$ and $\frac{1}{4}$ embryo all sides of these cells and thus completely enclose them, unless 'regeneration' or 'postgeneration' occurs. Consequently Mr. Crampton's so-called $\frac{1}{2}$ and $\frac{1}{4}$ embryos have at least made an attempt to become whole embryos, and Crampton and Wilson are wrong when they state that the power of 'regeneration' or 'postgeneration' is entirely absent.

A number of other points in this work were mentioned as affording evidence against instead of for the mosaic theory, even as modified by Wilson.

In general terms, the oblique cleavage is, of course, the result of the organization of the egg. It may be pointed out that it is the form of cleavage which brings each cell into contact with the greatest number of other cells. It is certainly not 'mechanical' in Wilson's sense, for even the constant direction of obliquity cannot be explained in this way.

O. Hertwig's view of the organization of the egg cannot be regarded as sufficient to explain the facts. Examples were given showing the extreme differences in the allotment of yolk in different species even when the yolk was similarly placed in the unsegmented egg. There is an organization more fundamental than the visible one, which governs both the form of cleavage and the position of yolk in the blastomeres.

The egg appears to be a complex of substances possessing the power to produce an embryo and through this an adult, by a series of processes not as yet understood. Visible localization in the egg or early cleavage stages, which is only a localization of protoplasm and deutoplasm, does not necessarily imply a corresponding location of the morphogenetic factors. The facts rather appear to indicate that what we call the morphogenetic factors are the processes going on in the egg as a whole. Any strictly cellular theory of development must be inadequate, as Dr. Whitman has shown.

In the final analysis the organization of the egg is dependent on the structure of the 'idioplasm.' This would seem to favor Dr. Whitman's view that the egg has a definite organization from the start. The localization of protoplasm and deutoplasm, however, which

we find in the mature egg must be acquired during ovigenesis. C. M. CHILD.

TORREY BOTANICAL CLUB, MARCH 9, 1897.

THE Secretary announced the conditions of a grant now offered from the funds left by Professor Newberry for encouragement of research, to be supplied successively to zoology, botany, geology and paleontology. For the present year the award is offered in geology or paleontology to amount to \$50.00, payable July 15, 1897, the competitors to belong to the Scientific Alliance of New York City.

The scientific program was then taken up, the evening being devoted to the subject of ferns, with papers as follows:

1. Mrs. Elizabeth G. Britton, 'Notes on some Mexican Ferns,' presented in Mrs. Britton's absence by Dr. Rusby, with exhibition of numerous specimens, including species of *Pellaea*, *Polypodium*, *Cystopteris* and *Cheilanthes*. Dr. Rusby, having been himself present at their collection, described vividly the tongue of hard, black lava on which the collectors walked, and which was filled with large cavities often forming caves, containing some accumulation of soil and crowded with a luxuriant growth of ferns, although in November and practically the winter season.

2. Mr. Willard N. Clute, 'The New York Stations for *Scolopendrium*.' Mr. Clute contrasted the wide distribution of the Hart's-tongue fern in the old world, from the Azores to Japan, with the extremely local North American occurrence, in five areas only, Mexico, Tennessee, central New York, Owen Sound, in Ontario and New Brunswick. The central New York locality was made known early in the present century through John Williamson, and was visited by Pursh in July, 1807, who found it five miles west of Syracuse on the farm of J. Geddes, where it has recently been rediscovered. About 1827 Wm. Cooper discovered it at Chittenango Falls, where Mr. Clute found hundreds of plants growing last summer. Mr. Clute described the Chittenango ravine and its ferns. On sunny exposures of the limestone walls of the ravine grow rue spleenwort and purple cliff-brake in

quantities; in shady places the slender cliff-brake; on the talus upon the larger boulders the walking fern, and in the shade of these boulders the *Scolopendrium*, chiefly in clusters of 2 to 6, at first erect, finally somewhat drooping, and ripe in September. Mr. Clute added that the species seems to be increasing at present, being now under the protection of an association.

3. The third paper was by Mr. B. D. Gilbert, of Utica, N. Y., entitled 'New and interesting Ferns from Bolivia,' with exhibition of specimens of two new ferns, a species of *Blechnum* and a new variety of *Nephrodium villosum*, the first peculiar in being fully pinnate, the second in being a one-sided dwarf persistently under a foot and a half high, instead of 4 or 5 feet as its type.

4. The fourth paper, also by Mr. Gilbert, 'Jamaica, the Fern-Lover's Paradise,' described the abundance of species and of individuals which the speaker had collected there, illustrating the subject by numerous specimens. He remarked that Swartz in his *Species Filicum*, 1783-6, enumerating all then-known ferns, described 709 species, of which 149 were from Jamaica; the Jamaican number was raised to 300 by Grisebach and now to 500 by resident botanists there, an estimate confirmed by Mr. Gilbert. Probably no other equal area produces half that number. Among reasons which account for this are the warm latitude of Jamaica, its south shore sheltered from cooler breezes by a mountain wall, its mountains themselves rising to 7,000 feet and reaching into a cool temperature climate, and its great variation in moisture, with daily rains in the mountains and sometimes but twice in six months on the plain.

EDWARD S. BURGESS,
Secretary.

BOSTON SOCIETY OF NATURAL HISTORY.

A GENERAL meeting was held January 2, 1897; forty-three persons present. Professor W. O. Crosby gave an account of the dike-like masses of sandstone that occur in the granite of the Pike's Peak massif in the Ute Pass, Colorado. For an Abstract see SCIENCE, page 604 above.

The Society met February 3d; one hundred and six persons present.

Mr. William C. Bates spoke of Venezuela and British Guiana, giving a brief historical account of their discovery, and describing, with the aid of a series of stereopticon views, various points of interest connected with their natural history, scenery and people.

SAMUEL HENSHAW,
Secretary.

THE ACADEMY OF SCIENCE OF ST. LOUIS.

At the meeting of the Academy of Science of St. Louis held on the evening of April 5, 1897, Professor Frederick Starr, of the University of Chicago, briefly addressed the Academy on the functions of such organizations, with especial reference to local problems. Mr. H. C. Irish presented a paper on the relations of the unfolding of plants in spring to meteorological conditions, in which were embodied deductions drawn from a series of observations made at the Missouri Botanical Garden, and those by other observers, extending back to the time of Stillingfleet, in the last century. Mr. Charles Robertson presented for publication a paper entitled 'North American Bees—Descriptions and Synonyms.'

WM. TRELEASE,
Secretary.

SCIENCE CLUB OF THE UNIVERSITY OF WISCONSIN.

At the regular meeting of the Club held March 11th the only paper of the evening was by Wm. B. Miller on 'Pulmonary Architecture.' The object of the paper was to show that in the structure of the lung there is a definite relation of the bronchi, blood and lymph vessels to each other; and that there is to be found in the lung the same as in the liver, intestines and other organs, a *unit* which repeats itself throughout the entire organ, and that when this unit is understood there is little difficulty in understanding the whole organ. The paper was illustrated by means of numerous models, macroscopic and microscopic preparations.

WM. S. MARSHALL,
Secretary.